



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
|-----------------|-------------|----------------------|---------------------|------------------|

10/577,753

07/20/2006

Catherine Daines

4195-033

2835

24112 7590 04/29/2008

COATS & BENNETT, PLLC
1400 Crescent Green, Suite 300
Cary, NC 27518

EXAMINER

STELLING, LUCAS A

ART UNIT

PAPER NUMBER

1797

MAIL DATE

DELIVERY MODE

04/29/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|--------------------------------------|--|
| Office Action Summary | Application No. 10/577,753 | Applicant(s) DAINES ET AL. | |
| | Examiner Lucas Stelling | Art Unit 1797 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 April 2006 and 30 June 2006 and 02 Ja.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 27-57 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 27-57 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 4/27/2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>7/20/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Preliminary Amendments

1. Multiple sets of claims have been presented by applicant in communications on 04-27-06, 6-30-06, and 1-02-07. Examination is proceeding with the latest filed claims of 01-02-07. Claims 1-26 are canceled; new claims 27-57 are added and examined on the merits.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 27, 28, 33, 34, 38- 40, 42, 44, 47- 50, and 53- 55 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,607,593 to Cote et al. ("Cote").

4. As to claims 27, 28, 33, 34, and 40 Cote teaches a method of treating an aqueous effluent containing organic matter in a single chamber reactor having an immersed membrane filtration unit (**col. 2 lines 60-65; and col. 12 lines 35-40 for microfiltration**) and a bed of catalyst material (**col. 6 lines 65 -- col. 7 line 5**) disposed in the reactor, the method comprising:

directing the effluent into the reactor (**col. 9 lines 20-25**) ;

injecting an oxidizing gas into the reactor in a direction generally counter the direction of flow of the effluent (**See Fig. 6, and col. 9 lines 20-35; ozone is**

injected from above to the bottom of the reactor, creating a flow upward.

the injection direction is therefore counter to the flow direction);

directing the effluent through the bed of catalyst material (**col. 7 lines 1-5;**
the catalyst material is activated carbon and is in the treatment chamber;
and the raw water is directed through the treatment chamber, see col. 9
lines 30-40) and wherein the catalyst material promotes the oxidation reaction of
organic material in the effluent, or promotes the absorption of organic material by
the bed of catalyst material (**activated carbon absorbs organic material**).

5. As to claim 38, Cote teaches that the membrane filtration unit are ozone-resistant organic membranes like PVDF or PTFE (**col. 4 lines 50-55**).

6. As to claim 39, these limitations are an inherent property of the device used in the method of Cote.

7. As to claim 42, Cote teaches recirculation of the permeate, or treated water back into the treatment chamber (**col. 9 lines 10-20**).

8. As to claim 44, Cote uses a column formation (**See Fig. 6**).

9. As to claims 47-49, Cote uses a pump with pressure of 0.2 -- 0.8 bars to remove the permeate, or treated water from the treatment chamber, and thereby draw it through the membranes (**col. 9 lines 40-50**).

10. As to claim 50, Cote teaches a system for treating water comprising:
a single chamber reactor (**2**) having an inlet (**4**) through which the aqueous effluent passes into the reactor;

Art Unit: 1797

an oxidizing gas outlet **(6)** disposed in the reactor for directing an oxidizing gas into the reactor;

an immersed membrane filtration device **(3)** disposed in the reactor;

an area defined between the membrane filtration device and the oxidizing gas outlet **(col. 9 lines 20-30; filtration zones are operationally after the injection of ozone and operationally before the membrane, and are contained within the sheaths 5, and see Fig. 6)** for a bed of catalyst material; and

wherein the oxidizing gas outlet is arranged in the reactor such that the oxidation gas outlet directs an oxidizing gas therefrom in a direction generally counter to the flow of the aqueous effluent through the reactor **(See Fig. 1, water enters at the top of the device 4, and leaves at the bottom of the device through 7, while gas enters from 22, through 6, see Fig. 6, which causes it to enter below the filtration membrane. Excess gas is drawn off at 12. So the general flow of the oxidizing gas is "up" through the device, and the general flow of liquid is "down" through the device).**

11. As to claim 53, Cote uses a column formation **(See Fig. 6)**.

12. As to claims 54-55, Cote uses a powdered activated carbon **(col. 7 lines 1-5; activated carbon has the capacity to absorb organic materials)**.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to

Art Unit: 1797

be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

15. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

16. Claims 29, 31, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cote in view of U.S. Patent No. 4,795,735 to Liu et al. ("Liu").

17. As to claim 29, Cote teaches the method of claim 28, but does not teach that the solid mineral is doped with a metallic substance. Liu teaches the use of an activated carbon/alumina composition for removal of organic pollutants and

Art Unit: 1797

ammonia (**Liu abstract and col. 1 lines 15-35**). Liu teaches that the addition of alumina allows for the absorption of polar and inorganic pollutants without shortening the service life of the all-carbon absorber (**Liu col. 1 lines 15-35**). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to use alumina doped activated carbon instead of the activated carbon in Cote in order to increase the ability to absorb polar and inorganic pollutants and thereby extend its service life.

18. As to claims 31, and 32, Cote teaches the method of claim 27, but is silent as to the size of the activated carbon granules used. Liu teaches using a composition with 80 to 600 mesh (**Liu col. 2 lines 55-65**) which is approximately 30-180 μ m grating size. It is within the understanding of a person of ordinary skill in the art to use a fine mesh size in order to maximize the surface area of the catalyst material, however, Cote confines the treatment material to the treatment chamber, so the particle size must be larger than the pore size of the membrane filter in Cote. It is within the skill of a person of ordinary skill in the art to optimize the mesh size of the catalyst in order to maximize the reactive surface area and to ensure it is not transported through the filter. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to provide catalyst particles in the size of 10 μ m -- 40 μ m in order to maximize the reactive surface area and to confine the particles to the treatment chamber.

Art Unit: 1797

19. Claims 30, 41, and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cote in view of U.S. Patent Application Publication No. 2001/0022290 to Shiota et al. ("Shiota").

20. As to claim 30 and 56, Cote teaches the the method of claim 27 and 50, respectively, but is silent as to whether the catalyst forms into a fluidized bed. Shiota teaches that the use of a fluidized bed form in the catalytic reactor reduces the possibility of generating a hotspot, and also uniformly degrades the catalyst material (**Shiota [0111]**). Therefore it would have been obvious to a person of ordinary skill in the art at the time of invention to use a fluidized catalyst bed in the method of Cote in order to prevent hotspots and to allow for uniform degradation of the catalyst.

21. As to claim 41, Cote teaches the method of claim 27 but does not teach introducing H₂O₂ into the reactor. Shiota teaches using peroxide as an activated carbon catalyst oxidation treatment in order to increase the carbon catalytic activity in the presence of inorganic contaminants (**Shiota [0060] and [0063]**). Therefore it would have been obvious to a person of ordinary skill in the art at the time of invention to further add peroxide to the reactor in Cote in order to increase the catalytic activity of the activated carbon in the presence of inorganic contaminants.

22. Claims 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cote in view of U.S. Patent No. 5,372,723 to de Geus et al. ("de Geus").

Art Unit: 1797

23. As to claims 35 and 36, Cote teaches the device of claim 27, but teaches that the filtration membranes are microfiltration membranes. Nanofiltration and ultrafiltration, as well as reverse osmosis, are substitutional equivalents in the field of water filtration when minute particles are to be removed (**de Geus abstract**). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to substitute the microfiltration membrane of Cote with either a nanofiltration or ultrafiltration membrane in order to remove particulates of a particular minute size. See also MPEP 2144.06 (II).

24. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cote in view of U.S. Patent No. 4,081,365 to White et al. ("White").

25. As to claim 37, Cote teaches the method of claim 27 but does not teach the use of a mineral filtration unit. White teaches the use of a mineral filtration unit in association with an activated carbon bed (**White col. 3 lines 1-10**). It is within the understanding of a person of ordinary skill in the art, and conventional to use a mineral filtration unit to adjust the mineral content of an effluent and to remove certain inorganic material. Therefore it would have been obvious to a person of ordinary skill in the art at the time of invention to further provide a mineral filtration unit in the device used in the method of Cote in order to adjust the mineral content and remove inorganic material.

26. Claims 45 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cote.

Art Unit: 1797

27. As to claims 45 and 46, Cote teaches the method of claim 27 but is silent as to the length of time the effluent is reacted in the ozone reaction chamber. It is within the understanding of a person of ordinary skill in the art that contact time with a catalyst is a result effective variable, based on the reactivity of the catalyst and the concentration of the constituents to be reacted. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to optimize the dwell time of the effluent with that catalyst in Cote in order to fully oxidize all of the contaminants.

28. Claims 43, 51, and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cote in view of U.S. Patent No. 4,076,617 to Bybel et al. ("Bybel").

29. As to claim 43, Cote teaches the device of claim 27, but the unreacted ozone gas is recovered and destroyed (**Cote 12, Fig. 1, and col. 9 lines 1-5**). Bybel teaches the recovery and reuse of ozone in a water treatment system (**Bybel See Fig. 1, and col. 3 lines 15-25**). It would have been obvious to a person of ordinary skill in the art at the time of invention to reuse the unreacted ozone gas in order to conserve power needed to produce ozone.

30. As to claims 51 and 52, Cote teaches the device of claim 27, and further teaches Cote teaches recirculation of the permeate, or treated water back into the treatment chamber (**col. 9 lines 10-20**); but, Cote is different in that unreacted gas is recovered and destroyed. Bybel teaches the recovery and reuse of ozone in a water treatment system (**Bybel See Fig. 1, and col. 3 lines**

Art Unit: 1797

15-25). It would have been obvious to a person of ordinary skill in the art at the time of invention to reuse the unreacted ozone gas in order to conserve power needed to produce ozone.

31. Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cote and Shiota as applied to claim 56 above, and further in view of Liu.

As to claim 57, Cote as modified by Shiota teaches the system of claim 56, but is silent as to the mesh size of the particles. Liu teaches using a composition with 80 to 600 mesh (**Liu col. 2 lines 55-65**) which is approximately 30-180 μ m grating size. It is within the understanding of a person of ordinary skill in the art to use a fine mesh size in order to maximize the surface area of the catalyst material.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to provide catalyst particles sized under 100 μ m in order to maximize the reactive surface area.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lucas Stelling whose telephone number is (571)270-3725. The examiner can normally be reached on Monday through Thursday 12:00PM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on 571-272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1797

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Matthew O Savage/
Primary Examiner, Art Unit 1797

las